REMARKS

Informalities.

Priority.

In response to Examiner's assertion that Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date, Applicant has amended the specification to reference the parent application filed December 16, 1997, now U.S. Pat. Reg. No. 6,037,945. Applicant thanks the Examiner for noting this deficiency.

Drawings.

The Examiner has noted that Figures 1-9 are described in the specification, but are not present in the application. In response, Applicant respectfully submits replacement Figures 1-9. These drawings add no new subject matter as each is sufficiently described by the specification as originally filed.

Claim Objections.

Claim 21 stands objected to for insufficient antecedent basis for the limitation "said morphing step" in limitation (c). In response, Applicant has amended claim 21 to recite "said altering step" which derives proper antecedent basis from the previously recited altering step in limitation (b).

Claim Rejections under 35 U.S.C. § 112.

Claims 1-22 stand rejected under 35 U.S.C. § 112, first paragraph ("Section 112") because the specification does not reasonably provide enablement for types of estimation polyhedrons other than area estimation, volume estimation and cost estimation. In response, Applicant has amended independent claims 1, 5, 10, 15 and 21 to recite an estimation polyhedron "wherein said estimation polyhedron estimates at least one of the group consisting of an area, volume and costs associated

with at least one of said facets." This amendment adds no new matter as it is sufficiently disclosed and enabled by the specification as filed. Applicant thus respectfully requests withdrawal of the rejection of claims 1-22 under Section 112.

Claim Rejections under 35 U.S.C. § 102.

Claims 1-2 and 5 stand rejected under 35 U.S.C. § 102(b) ("Section 102(b)") as anticipated by Schmitt, F., "An Adaptive Subdivision Method for Surface Fitting from Sampled Data," Proceedings of the 13th Annual Conference on Computer Graphics and Interactive Techniques (1986) at179-188 ("Schmitt").

An invention is unpatentable under Section 102(b) if "the invention was . . . described in a printed publication . . . more than one year prior to the date of the application for patent in the United States." A Section 102(b) rejection is only appropriate, however, where the "reference fully discloses in every detail the subject matter of a claim." See *Application of Foster*, 383 U.S. 966 (1966). For the reasons set forth below, Applicant submits that the reference cited by the Examiner does not teach each and every element of the claimed invention, as amended, and thus does not anticipate the present invention.

As amended, claim 1 recites "selecting a default volumetric polyhedron as an estimation polyhedron [and] revising said at least one estimation attribute of said morphed facet and adjacent ones of said plurality of facets of said estimation polyhedron as modified by said morphing step in order to maintain a closed volume of said estimation polyhedron." This amendment finds support in the specification as filed, as the specification teaches that the "default entity utilized by the estimator [is] a volumetric entity having spatial definitions and attributes in all three dimensions," and further that "the default entity is a polyhedron which, by definition is a series of planes forming

a closed volume." See Specification, p. 7, ln. 20-25. Applicant finds no mention of this element in Schmitt, nor any equivalent thereof.

Indeed, Schmitt discloses a surface-fitting method utilizing an adaptive subdivision approach. See p. 180, col. 1. Although Schmitt teaches initial approximation of the sampled data utilizing a default surface, such default surface is strictly two-dimensional, derived from a "piecewise polynomial." See p. 180, col. 2; see also Figures 11(a) and 12(a). As Schmitt fails to disclose initially selecting and thereafter maintaining a three–dimensional volumetric polyhedron as claimed by the present application, Schmitt fails to anticipate the present invention under Section 102(b).

Claims 2-5 place further limitations on otherwise allowable subject matter and should not therefore be considered anticipated under Section 102(b).

In light of the foregoing amendment and remarks, Applicant respectfully requests withdrawal of the rejections of claims 1-2 and 5, and the objections to claims 3 and 4, under Section 102(b).

Claim Rejections under 35 U.S.C. § 103.

Claims 3-4, and 6-20 stand rejected under Section 103 as unpatentable over Schmitt, F., "An Adaptive Subdivision Method for Surface Fitting from Sampled Data," Proceedings of the 13th Annual Conference on Computer Graphics and Interactive Techniques (1986) at179-188 ("Schmitt") in view of MacCracken, R., "Free-Form Deformations with Lattices of Arbitrary Topology," Proceedings of the 23rd Annual Conference on Computer Graphics and Interactive Techniques (1986) at 181-188 ("MacCracken"). Claims 21-22 stand rejected under Section 103 as unpatentable over Lerios, A., "Feature-based Volume Metamorphosis," Proceedings of the 22nd Annual Conference on Computer Graphics and Interactive Techniques (1995) at 449-456 ("Lerios"), as well as U.S. Pat. No. 5,850,229 to Edelsbrunner ("Edelsbrunner").

An invention is unpatentable under 35 U.S.C. § 103(a) ("Section 103") "if the differences between the subject matter sought to be patented over the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains."

To establish a *prima facie* case of obviousness, three criteria must be met. "First, there must be some suggestion or motivation . . . to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." MPEP § 2142.

"Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." *In re John R. Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992). Any such suggestion must be "found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 493 (Fed. Cir. 1991).

A "clear and particular" showing of the suggestion to combine is required to support an obviousness rejection under Section 103. *Id.* For the reasons set forth below, Applicant submits that the prior art fails both to teach or suggest all the claim limitations, and to clearly and particularly suggest the combination indicated by the Examiner; thus, Applicant's claims are not obvious in view of the prior art references.

In rejecting Applicant's claims 3-4 and 6-20, Examiner has disregarded significant claim limitations of the present application, as amended. Dependent claims 3 and 4 depend from independent claim 1 which recites "selecting a default volumetric polyhedron as an estimation polyhedron, said estimation polyhedron having a plurality of facets with each comprised of at least one estimation attribute." An estimation attribute is defined to include "the attribute of a 'missing wall.'" See Specification, p. 18, ln. 7-9. Such limitations are also present in Applicant's independent

claims 6, 10, 15 and 21.

As discussed above with reference to Section 102(b), Schmitt discloses a surface-fitting method utilizing an adaptive subdivision approach. Schmitt relies on a rough two-dimensional surface approximation which is then subdivided and altered as necessary to accurately represent the subject surface. Schmitt neither discloses nor suggests selecting a default volumetric estimation polyhedron and maintaining its volumetric integrity throughout the estimation process as disclosed by the present application.

MacCracken, on the other hand, discloses a method of achieving free-form deformations with lattices of arbitrary topology. MacCracken limits the method's application, however, to lattice cells that "are closed, meaning that the faces comprising the cells do not form any holes. For example, a cube with one face missing is not a valid cell." See MacCracken p. 182, col. 2. MacCracken thus not only fails to disclose a method for modeling a chamber to enable estimation of chamber attributes as claimed by the present invention, but in fact teaches away from estimation attributes altogether as defined by Applicant's specification. Indeed, whereas the present application specifically recognizes that a plane may be given the attribute of "missing," MacCracken specifies that a polyhedron with a missing face is not valid and may not be utilized for the purposes of the MacCracken invention. Moreover, MacCracken is properly considered non-analogous art as the purpose of the invention disclosed therein is to deform an already defined space rather than to initially define a space. One skilled in the art would therefore not be motivated to modify MacCracken to model a chamber and assign facets of the chamber estimation attributes as disclosed by the present invention.

As neither Schmitt and MacCracken suggest the combination asserted by the Examiner and since, even if combined as the Examiner suggests, the references will not produce Applicant's

invention, claims 6, 10, and 15 are not rendered obvious under Section 103 in view of such references.

Claims 3-4, 7-9, 11-14, and 16-20 place further limitations on otherwise allowable subject matter and should not therefore be considered obvious under Section 103.

Claims 21 and 22 stand rejected as obvious in light of Lerios and further in light of Edelsbrunner. Lerios teaches 3D metamorphosis applied to volume-based representations of objects. Edelsbrunner discloses a method of geometric morphing between a first object and a second object.

Claim 21 teaches a method for computerized modeling of a chamber to enable estimation of chamber attributes utilizing a single default polyhedron as an estimation polyhedron. Applicant finds no mention of this element in any reference, nor any equivalent thereof. Rather, Lerios and Edelsbrunner require at least two input images or volumes in order to create a morphed image. See Lerios, p. 450, Section 3.1; see also Edelsbrunner Abstract.

Further, the problems solved by Lerios and Edelsbrunner are patentably distinct from the problem solved by the present invention. Thus, one ordinarily skilled in the art would not look to Lerios or Edelsbrunner when contemplating the method of computerized modeling of a chamber disclosed by the present invention. Indeed, Lerios and Edelsbrunner contemplate the creation of a single combination image that exhibits unique features derived from at least two pre-existing parent images. Neither Lerios nor Edelsbrunner contemplates the independent creation of a model having attributes akin to that of an existing or imagined chamber, as presently disclosed. Moreover, by initially requiring at least two preexisting images or volumes, the combination of which constitute the resulting morphed image, Lerios and Edelsbrunner teach away from the present invention which originates from a single default polyhedron, which may or may not preexist.

As neither Lerios nor Edelsbrunner suggest the combination asserted by the Examiner and

since, even if combined as the Examiner suggests, the references fail to produce Applicant's invention, claim 21 is not rendered obvious under Section 103 in view of such references.

Claim 22 places further limitations on otherwise allowable subject matter and should not therefore be considered obvious under Section 103.

In light of the above, Applicant respectfully submits that the inability of the combined references to produce Applicant's invention and the lack of any suggestion or motivation to modify such art to produce Applicant's invention renders the present invention non-obvious in view of such references. Accordingly, Applicant respectfully requests withdrawal of the rejections of claims 3-4, 6-20 and 21-22 under Section 103.

Double Patenting.

Claims 1-5, 6-9, 10-14, 15-20 and 21-22 stand rejected under the judicially created doctrine of double patenting over U.S. Pat. Reg. No. 6,037,945 to Loveland (the "'945 Patent").

In response, as the applications are commonly owned, Applicant is submitting a properly executed terminal disclaimer pursuant to 37 C.F.R. § 1.321(c) to overcome this rejection.

Conclusion

Based on the foregoing, Applicant believes that the claims of the present invention are in condition for allowance and respectfully requests the same.

Should the Examiner have any questions, comments, or suggestions in furtherance of the prosecution of this application, the Examiner is invited to initiate a telephone interview with undersigned counsel.

DATED this 10 day of January, 2003.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Please insert the following paragraph at page 2, line 2:

1. Related Applications

This application claims priority to the parent application filed December 16, 1997, now U.S. Patent Registration No. 6,037,945, entitled, "Graphical Method for Modeling and Estimating Construction Costs."

IN THE CLAIMS:

1. (Amended) A method for modeling a chamber to enable estimation of chamber attributes, comprising the steps of:

(a) selecting a default volumetric polyhedron as an estimation polyhedron, said estimation polyhedron having a plurality of facets with each comprised of at least one estimation attribute including an area, wherein said estimation polyhedron estimates at least one of the group consisting of an area, volume and costs associated with at least one of said facets;

(b) morphing a selected facet of said plurality of facets of said estimation polyhedron into a morphed facet to approximate said chamber undergoing estimation;

(c) revising said at least one estimation attribute of said morphed facet and adjacent ones of said plurality of facets of said estimation polyhedron as modified by said morphing step in order to maintain a closed volume of said estimation polyhedron; and

(d) repeating said morphing and revising steps until said estimation polyhedron accurately depicts said chamber undergoing estimation.

6. (Amended) A method for graphically estimating attributes of a room, comprising the steps of:

(a) selecting a default volumetric polyhedron as an estimation polyhedron to approximate said attributes of said room, said estimation polyhedron having a plurality of facets with each comprised of at least one estimation attribute including an area, wherein said estimation polyhedron estimates at least one of the group consisting of an area, volume and costs associated with at least one of said facets;

(b) morphing one of said plurality of facets of said estimation polyhedron to approximate said room undergoing estimation;

(c) revising said at least one estimation attribute of said morphed facet and adjacent facets of said estimation polyhedron in order to maintain a closed volume of said estimation polyhedron;

(d) repeating said morphing and revising steps until said estimation polyhedron accurately depicts said room undergoing estimation; and

(e) listing said estimation attributes of said estimation polyhedron as said attributes of said room.

10. (Amended) A graphical method for estimating material requirements for a room within a structure, wherein said room is comprised of a plurality of planes, comprising:

(a) displaying a default surface polygon, said surface polygon forming one

plane of a plurality of planes of ~~an~~ a volumetric estimation polyhedron for approximating said room, said plurality of planes each further having an estimation attribute assigned thereto, wherein said estimation polyhedron estimates at least one of the group consisting of an area, volume and costs associated with at least one of said facets;

(b) morphing said default surface polygon into a morphed polygon to approximate a plane of said room undergoing estimation;

(c) revising said estimation attribute of said morphed polygon and adjacent ones of said plurality of planes affected by said morphing step in order to maintain a closed volume of said estimation polyhedron;

(d) repeating said morphing and revising steps until said estimation polyhedron accurately approximates said room undergoing estimation; and

(e) converting said estimation attributes of said estimation polyhedron into said material requirements for said room within said structure.

15. (Amended) A computer-readable medium having computer-executable instructions for performing the steps comprising:

(a) displaying a default surface polygon, said surface polygon forming one plane of a plurality of planes of ~~an~~ a volumetric estimation polyhedron for approximating said room, said plurality of planes each further having an estimation attribute assigned thereto, wherein said estimation polyhedron estimates at least one of the group consisting of an area, volume and costs associated with at least one of said facets;

(b) morphing said default surface polygon into a morphed polygon to approximate a plane of said room undergoing estimation;

(c) revising said estimation attribute of said morphed polygon and adjacent ones of said plurality of planes affected by said morphing step in order to maintain a closed volume of said estimation polyhedron;

(d) repeating said morphing and revising steps until said estimation polyhedron accurately approximates said room undergoing estimation; and

(e) converting said estimation attributes of said estimation polyhedron into said material requirements for said room within said structure.

21. (Amended) A method for computerized modeling of a chamber to enable estimation of chamber attributes, comprising the steps of:

(a) selecting a default polyhedron as ~~an~~ a volumetric estimation polyhedron, said estimation polyhedron having a plurality of vertices and facets each facet having at least one characteristic and comprised of at least one estimation attribute including an area, wherein said estimation polyhedron estimates at least one of the group consisting of an area, volume and costs associated with at least one of said facets;

(b) dragging at least one of said plurality of vertices to alter at least one of said characteristics of a facet of said estimation polyhedron to approximate said chamber undergoing estimation;

(c) recalculating said at least one estimation attribute of said altered facet and adjacent ones of said plurality of facets of said estimation polyhedron as modified by said ~~morphing~~ altering step in order to maintain a closed volume of said estimation polyhedron; and

(d) repeating said altering and recalculating steps until said estimation

polyhedron accurately depicts said chamber such that said calculated estimation attribute accurately estimates said chamber.